CLAIMS

1. An intelligent robot arm system comprising an intelligent robot arm and a mounting frame, wherein the intelligent robot arm is assembled on the mounting frame which comprises a feeding area and a target area, wherein the intelligent robot arm comprises a main control unit, a transmission mechanism and a gripping device which are both connected with and controlled by the main control unit, wherein the transmission mechanism is arranged on the mounting frame and connected with the gripping device and drives the gripping device to transmits documents reciprocally between the feeding area and the target area under a control of the main control unit, wherein the main control unit controls the gripping device to grip and release;

wherein the transmission mechanism comprises a first horizontal transmission device, a vertical transmission device , and a second horizontal transmission device, which are all connected with and controlled by the main control unit;

wherein first horizontal transmission device is arranged on the mounting frame and connected with the vertical transmission device, and drives the vertical transmission device to reciprocate along a first horizontal direction in a horizontal plane;

wherein the vertical transmission device is connected with the second horizontal transmission device, and drives the second horizontal transmission device to reciprocate in a vertical direction;

wherein the second horizontal transmission device is connected with the gripping device, and drives the gripping device to reciprocate along a second horizontal direction in the horizontal plane; wherein there is an angle θ between the second horizontal direction and the first horizontal direction, and the angle θ satisfies $0° < \theta < 180°$;

wherein the first horizontal transmission device comprises a first drive component, a first slide joint component and a first support frame, wherein the first slide joint component is connected between the mounting frame and the first support frame, so that a slide direction of the first support frame relative to the mounting frame is the first horizontal direction, wherein the first drive component drives the first support frame to slide reciprocally along the first horizontal direction under the control of the main control unit, while the vertical transmission device is fixedly connected with the first support frame;

wherein the first horizontal transmission device further comprises a second drive component, a second slide joint component and a second support frame, wherein the second slide joint component is connected between the mounting frame and the second support frame, so that a slide direction of the second support frame relative to the mounting frame is the second horizontal direction, wherein the second drive component drives the second support frame to slide reciprocally along the first horizontal direction and synchronized with the first support frame the control of the main control unit, while the vertical transmission device is fixedly connected with the second support frame;

wherein the vertical transmission device comprises a vertical drive component, a vertical fixing frame and a vertical support frame; wherein two ends of the vertical fixing frame are fixedly connected with the first support frame and the second support frame respectively; wherein the vertical drive component drives the vertical support frame to slide reciprocally along the vertical direction relative to the vertical fixing frame under the control of the main control unit; wherein the second horizontal transmission device is fixedly connected with the vertical support frame;

wherein the vertical transmission device further comprises a power-off protection structure, which further including a lock head, an elastic element, a transmission component, a drive element and a mounting housing fixed on the vertical support frame; wherein the mounting housing is provided with a through hole on a side wall facing the vertical fixing frame, and the transmission component is arranged in the mounting housing and electrically connected with the drive element; wherein a transmission end of the transmission component passes through the through hole and is connected with the lock head; wherein the elastic element is arranged on the transmission end of the transmission component and compressed between the lock head and the mounting housing;

wherein a plurality of locking positions are arranged on a surface of the vertical fixing frame facing the lock head at intervals along the vertical direction;

wherein, the lock head has a retraction state of being pulled by the transmission component and keeping a safe distance from each locking position when the drive element is powered on, and a locking state of being extended by an elastic restoring force of the elastic element and locked with a corresponding locking position when the driving element is powered off;

wherein the second horizontal transmission device comprises a third drive component, a third slide joint component and a third support frame; wherein the third slide joint component is connected between the vertical support frame and the third support frame to enable the third support frame to slide relative to the vertical support frame, and the sliding direction is the second horizontal direction; wherein the third drive component drives the third support frame to slide reciprocally along the second horizontal direction under the control of the main control unit.

2. The intelligent robot arm system according to claim 1, wherein the transmission component includes a push rod and a transmission element thread-connected with an output shaft of the drive element, wherein one end of the push

rod is fixedly connected with the transmission element, and the other end of the push rod extended through the through hole and is fixedly connected with the lock head; wherein the elastic element is sleeved on the extended end of the push rod, and the transmission element is circumferentially positioned in the mounting housing; or

the transmission component comprises a push rod and a transmission element moves synchronously with an output shaft of the drive element; wherein one end of the push rod is hinged with the transmission element, and its hinged position has a certain distance from an axis, and the other end of the push rod is extended out through the through hole and fixedly connected with the lock head; wherein the elastic element is sleeved on the extended end of the push rod.

3. The intelligent robot arm system according to claim 1 or 2, wherein the transmission mechanism further comprises a rotation transmission component, which is fixed on the second horizontal transmission device and drives the gripping device to rotate around a power output shaft of the rotation transmission component under the control of the main control unit; wherein the second horizontal transmission device drives the rotation transmission component to move reciprocally along the second horizontal direction with the gripping device.

4. The intelligent robot arm system according to claim 3, wherein the gripping device comprises a gripping power producer, a gripping component and a gripping support frame which is connected with the power output shaft of the rotation transmission component and rotates synchronously with the power output shaft; wherein the gripping power source is fixed on the gripping support frame and connected with the gripping component and drives the gripping component to grip and release under the control of the main control unit.

5. The intelligent robot arm system according to claim 4, wherein the gripping device further comprises an identification unit for identifying and/or reading

document information from a document of the documents; wherein the identification unit faces said document when the gripping component grips said document, and the identification unit is arranged on the gripping support frame or the mounting frame.

6. The intelligent robot arm system according to claim 4, wherein the gripping device further comprises a gripping detection unit for detecting whether there is a document of the documents on the gripping component and for detecting whether said document is inserted into a specified position of the gripping component when gripping said document, wherein the gripping detection unit is arranged on the gripping support frame.

7. The intelligent robot arm system according to claim 4, wherein the gripping device further comprises a target detection unit for detecting whether there is a document of the documents in a target position of the target area and a feeding position of the feeding area when said document is stored or taken out; wherein the target detection unit is arranged on the gripping support frame.

8. The intelligent robot arm system according to claim 4, wherein the gripping device further comprises a guiding frame arranged on the gripping support frame and can be elastically retracted relative to the gripping component; wherein the guiding frame is provided with a guiding structure opposite to the gripping component and used for directional importing and exporting said document when the gripping component grips said document or sends out the document, and supporting or holding an end of said document when the gripping component is transmitting said document.

9. The intelligent robot arm system according to claim 1 or 2, wherein the intelligent robot arm further comprises a visual detection unit for obtaining an image of a document of the documents to be gripped in the feeding area and calculating offset of said document; wherein the visual detection unit is arranged

on the gripping device and the main control unit controls a movement of the transmission mechanism according to the offset, and transmits the gripping device to a position aligned with said document to be griped.

10. An intelligent storage apparatus, comprising a server, a storage device, an intelligent robot arm and a mounting frame; wherein the intelligent robot arm is assembled on the mounting frame which comprises a feeding area and a target area;

wherein the intelligent robot arm comprises a main control unit, a transmission mechanism and a gripping device which are both connected with and controlled by the main control unit, wherein the transmission mechanism is arranged on the mounting frame and connected with the gripping device and drives the gripping device to transmits documents reciprocally between the feeding area and the target area under a control of the main control unit, wherein the main control unit controls the gripping device to grip and release;

wherein the transmission mechanism comprises a first horizontal transmission device, a vertical transmission device , and a second horizontal transmission device, which are all connected with and controlled by the main control unit;

wherein first horizontal transmission device is arranged on the mounting frame and connected with the vertical transmission device, and drives the vertical transmission device to reciprocate along a first horizontal direction in a horizontal plane;

wherein the vertical transmission device is connected with the second horizontal transmission device, and drives the second horizontal transmission device to reciprocate in a vertical direction;

wherein the second horizontal transmission device is connected with the gripping device, and drives the gripping device to reciprocate along a second horizontal direction in the horizontal plane; wherein there is an angle θ between the

second horizontal direction and the first horizontal direction, and the angle θ satisfies 0 ° < θ < 180 °;

wherein the first horizontal transmission device comprises a first drive component, a first slide joint component and a first support frame, wherein the first slide joint component is connected between the mounting frame and the first support frame, so that a slide direction of the first support frame relative to the mounting frame is the first horizontal direction, wherein the first drive component drives the first support frame to slide reciprocally along the first horizontal direction under the control of the main control unit, while the vertical transmission device is fixedly connected with the first support frame;

wherein the first horizontal transmission device further comprises a second drive component, a second slide joint component and a second support frame, wherein the second slide joint component is connected between the mounting frame and the second support frame, so that a slide direction of the second support frame relative to the mounting frame is the second horizontal direction, wherein the second drive component drives the second support frame to slide reciprocally along the first horizontal direction and synchronized with the first support frame the control of the main control unit, while the vertical transmission device is fixedly connected with the second support frame;

wherein the vertical transmission device comprises a vertical drive component, a vertical fixing frame and a vertical support frame; wherein two ends of the vertical fixing frame are fixedly connected with the first support frame and the second support frame respectively; wherein the vertical drive component drives the vertical support frame to slide reciprocally along the vertical direction relative to the vertical fixing frame under the control of the main control unit; wherein the second horizontal transmission device is fixedly connected with the vertical support frame;

wherein the vertical transmission device further comprises a power-off protection structure, which further including a lock head, an elastic element, a transmission component, a drive element and a mounting housing fixed on the vertical support frame; wherein the mounting housing is provided with a through hole on a side wall facing the vertical fixing frame, and the transmission component is arranged in the mounting housing and electrically connected with the drive element; wherein a transmission end of the transmission component passes through the through hole and is connected with the lock head; wherein the elastic element is arranged on the transmission end of the transmission component and compressed between the lock head and the mounting housing;

wherein a plurality of locking positions are arranged on a surface of the vertical fixing frame facing the lock head at intervals along the vertical direction;

wherein, the lock head has a retraction state of being pulled by the transmission component and keeping a safe distance from each locking position when the drive element is powered on, and a locking state of being extended by an elastic restoring force of the elastic element and locked with a corresponding locking position when the driving element is powered off;

wherein the second horizontal transmission device comprises a third drive component, a third slide joint component and a third support frame; wherein the third slide joint component is connected between the vertical support frame and the third support frame to enable the third support frame to slide relative to the vertical support frame, and the sliding direction is the second horizontal direction; wherein the third drive component drives the third support frame to slide reciprocally along the second horizontal direction under the control of the main control unit;

wherein the storage device is arranged in the target area of the mounting frame, the storage device has a plurality of storage positions for storing the documents and each storage position has a unique address code recorded on the

server; wherein the main control unit is in communication connection with the server, and the transmission mechanism drives the gripping device to reciprocate between the target area and each storage position.

11. The intelligent storage apparatus according to claim 10, wherein the mounting frame has a transmission area which is equipped with at least one said intelligent robot arm; wherein the feeding area is positioned in the transmission area and provided with at least one transmission opening for document transmission, wherein each said intelligent robot arm at least corresponds to one transmission opening; wherein the target area is adjacent to the transmission area, and each storage position has one insertion opening facing said intelligent robot arm; or

the mounting frame has two transmission areas each equipped with at least one said intelligent robot arm; wherein the feeding area is equipped with two said intelligent robot arms positioned in the two transmission areas, respectively; wherein each feeding area is at least equipped with one transmission opening for document transmission; wherein each said intelligent robot arm at least corresponds to one transmission opening, and the two transmission areas are separately arranged at two opposite sides of the target area; wherein each storage position of the storage device has two communicated insertion openings, which face said intelligent robot arm on each side respectively.

12. An intelligent document issuance apparatus, comprising a server, an intelligent robot arm, a mounting frame and an operation component for document retrieval personnel to conduct a document retrieval operation; wherein the intelligent robot arm is assembled on the mounting frame which comprises a feeding area and a target area;

wherein the intelligent robot arm comprises a main control unit, a transmission mechanism and a gripping device which are both connected with and

controlled by the main control unit, wherein the transmission mechanism is arranged on the mounting frame and connected with the gripping device and drives the gripping device to transmits documents reciprocally between the feeding area and the target area under a control of the main control unit, wherein the main control unit controls the gripping device to grip and release;

wherein the transmission mechanism comprises a first horizontal transmission device, a vertical transmission device , and a second horizontal transmission device, which are all connected with and controlled by the main control unit;

wherein first horizontal transmission device is arranged on the mounting frame and connected with the vertical transmission device, and drives the vertical transmission device to reciprocate along a first horizontal direction in a horizontal plane;

wherein the vertical transmission device is connected with the second horizontal transmission device, and drives the second horizontal transmission device to reciprocate in a vertical direction;

wherein the second horizontal transmission device is connected with the gripping device, and drives the gripping device to reciprocate along a second horizontal direction in the horizontal plane; wherein there is an angle θ between the second horizontal direction and the first horizontal direction, and the angle θ satisfies $0° < \theta < 180°$;

wherein the first horizontal transmission device comprises a first drive component, a first slide joint component and a first support frame, wherein the first slide joint component is connected between the mounting frame and the first support frame, so that a slide direction of the first support frame relative to the mounting frame is the first horizontal direction, wherein the first drive component drives the first support frame to slide reciprocally along the first horizontal

direction under the control of the main control unit, while the vertical transmission device is fixedly connected with the first support frame;

wherein the first horizontal transmission device further comprises a second drive component, a second slide joint component and a second support frame, wherein the second slide joint component is connected between the mounting frame and the second support frame, so that a slide direction of the second support frame relative to the mounting frame is the second horizontal direction, wherein the second drive component drives the second support frame to slide reciprocally along the first horizontal direction and synchronized with the first support frame the control of the main control unit, while the vertical transmission device is fixedly connected with the second support frame;

wherein the vertical transmission device comprises a vertical drive component, a vertical fixing frame and a vertical support frame; wherein two ends of the vertical fixing frame are fixedly connected with the first support frame and the second support frame respectively; wherein the vertical drive component drives the vertical support frame to slide reciprocally along the vertical direction relative to the vertical fixing frame under the control of the main control unit; wherein the second horizontal transmission device is fixedly connected with the vertical support frame;

wherein the vertical transmission device further comprises a power-off protection structure, which further including a lock head, an elastic element, a transmission component, a drive element and a mounting housing fixed on the vertical support frame; wherein the mounting housing is provided with a through hole on a side wall facing the vertical fixing frame, and the transmission component is arranged in the mounting housing and electrically connected with the drive element; wherein a transmission end of the transmission component passes through the through hole and is connected with the lock head; wherein the elastic

element is arranged on the transmission end of the transmission component and compressed between the lock head and the mounting housing;

wherein a plurality of locking positions are arranged on a surface of the vertical fixing frame facing the lock head at intervals along the vertical direction;

wherein, the lock head has a retraction state of being pulled by the transmission component and keeping a safe distance from each locking position when the drive element is powered on, and a locking state of being extended by an elastic restoring force of the elastic element and locked with a corresponding locking position when the driving element is powered off;

wherein the second horizontal transmission device comprises a third drive component, a third slide joint component and a third support frame; wherein the third slide joint component is connected between the vertical support frame and the third support frame to enable the third support frame to slide relative to the vertical support frame, and the sliding direction is the second horizontal direction; wherein the third drive component drives the third support frame to slide reciprocally along the second horizontal direction under the control of the main control unit;

wherein the transmission mechanism, the gripping device and the operation component are connected with and controlled by the main control unit, the main control unit is in communication connection with the server, and the transmission mechanism drives the gripping device to reciprocate between the feeding area and the target area.

13. The intelligent document issuance apparatus according to claim 12, wherein further comprises an invalidation device comprising an invalidation drive source, an invalidation frame body, a movable frame body arranged on the invalidation frame body and an invalidation structure; wherein the invalidation frame body and the movable frame body together form an invalidation space having an invalidation position for inserting document; wherein the invalidation

position is arranged on the movable frame body or the invalidation frame body opposite to the movable frame body; wherein the invalidation structure is arranged in the invalidation space and opposite to the invalidation position; wherein the invalidation drive source is connected with and controlled by the main control unit, and the movable frame body is connected with the invalidation drive source and driven by the invalidation drive source to move the invalidation structure close to or far away from the invalidation position.

14. The intelligent document issuance apparatus according to claim 13, wherein there are two invalidation spaces, namely the first invalidation space and the second invalidation space, respectively placed on opposite sides of the movable frame body;

wherein there are two invalidation positions, namely a first invalidation position for inserting a book-type document and a second invalidation position for inserting a card-type document; wherein the first invalidation position is arranged in the first invalidation space, the second invalidation position is arranged in the second invalidation space; wherein the first invalidation position is arranged on the movable frame body or the invalidation frame body opposite to the movable frame body, and the second invalidation position is arranged on the movable frame body or the invalidation frame body opposite to the movable frame body;

wherein there are two invalidation structures, namely a first invalidation structure arranged in the first invalidation space and opposite to the first invalidation position, and a second invalidation structure arranged in the second invalidation space and opposite to the second invalidation position;

wherein the movable frame body is driven by the invalidation drive source to displace between in the first invalidation space and the second invalidation space.